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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/721,212	11/25/2003	Robert W. Turner	BO1 - 0184US	5522

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EXAMINER	
SMITH, JEFFREY S	

ART UNIT	PAPER NUMBER
2624	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/721,212	TURNER ET AL.	
	Examiner	Art Unit	
	Jeffrey S. Smith	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 August 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-27 and 29-32* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-27 and 29-32* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

The objections to the drawings are overcome for the reasons given in applicant's amendment filed August 6, 2007.

The objection to the specification is overcome for the reasons given in applicant's amendment filed August 6, 2007.

The rejections under 35 USC 112, first paragraph are overcome for the reasons given in applicant's amendment filed August 6, 2007.

Applicant's arguments filed August 6, 2007 have been fully considered but they are not persuasive.

Applicant argues that Lindgren discloses a projective panchromatic sharpening method and apparatus that combines registered high spatial resolution panchromatic imagery with lower spatial resolution multispectral imagery to synthesize higher spatial resolution multispectral imagery. Applicant argues that claim 1 as amended, which recites "spatially matching a plurality of multispectral band images produced by different sensors, the multispectral band images having different resolution levels" is different than spatially matching a panchromatic image with multispectral imagery. However, this is exactly what applicant is doing as discussed in the application as originally filed, which discloses

> Referring to FIGURE 3, an exemplary process 130 spatially matches images produced by a sensor (the block 82 of FIGURE 2). Each image produced by a sensor includes multispectral bands. A band of an image is a slice of wavelength from the electromagnetic spectrum. For example,

> the LandSat ETM+ (Enhanced Thematic Mapper Plus) includes eight bands that collect radiation from different parts of the electromagnetic spectrum. Of the eight bands, three bands are visible light, one band is panchromatic, three bands are infrared, and one band is thermal infrared. At block 140, the resolutions of the bands are matched to the most detailed level of all the bands of the images received from the sources. For example, if the most detailed frame unit of data in one band is 30 meters (i.e., 30 meter resolution) and 15 meter resolution is desired, the data in the 30 meter resolution frame is duplicated to occupy 4 subunits at 15 meter resolution within the original 30 meter unit.

Thus, the claimed "spatially matching a plurality of multispectral band images" is disclosed as spatially matching two or more images selected from the visible light bands, the panchromatic band, the infrared bands, and the thermal infrared band of each multispectral image. The example of matching a band with 30 meter resolution to a band with 15 meter resolution presumably means that the 30 meter visible light band is spatially matched with the 15 meter panchromatic band. Lindgren discloses spatially matching a plurality of multispectral band images produced by different sensors, the multispectral band images having different resolution levels (see column 6 lines 2-3 describing spatially overlapping visible light and panchromatic images) and spectrally correcting one or more of the spatially matched images based on one or more of the other images (see column 2 lines 25-29).

Applicant argues that Lindgren does not disclose means for performing a solar illumination correction. However, the solar illumination correction was well known in the prior art as disclosed by applicants on pages 5-7 of the disclosure as originally filed. This section of the disclosure appears to be copied directly from the Landsat-7 Science Data User's Handbook, and as such, is available as prior art.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-2 are rejected under 35 U.S.C. 103 as being anticipated by U.S. Patent No. 6,097,835 issued to Lindgren ("Lindgren") in view of U.S. Patent No. 7,171,912 issued to Fraisse et al. ("Fraisse").

Claim 1 recites "spatially matching a plurality of multispectral band images produced by different sensors, the multispectral band images having different resolution levels." Support for this claimed element can be found for example in figure 3 and pages 3-4 of the disclosure as originally filed, which discloses

> Referring to FIGURE 3, an exemplary process 130 spatially matches images produced by a sensor (the block 82 of FIGURE 2). Each image produced by a sensor includes multispectral bands. A band of an image is a slice of wavelength from the electromagnetic spectrum. For example, the LandSat ETM+ (Enhanced Thematic Mapper Plus) includes eight bands that collect radiation from different parts of the electromagnetic spectrum. Of the eight bands, three bands are visible light, one band is panchromatic, three bands are infrared, and one band is thermal infrared. At block 140, the resolutions of the bands are matched to the most detailed level of all the bands of the images received from the sources. For example, if the most detailed frame unit of data in one band is 30 meters (i.e., 30 meter resolution) and 15 meter resolution is desired, the data in the 30 meter resolution frame is duplicated to occupy 4 subunits at 15 meter resolution within the original 30 meter unit.

Thus, the claimed "spatially matching a plurality of multispectral band images" is disclosed as spatially matching two or more images selected from the visible light

bands, the panchromatic band, the infrared bands, and the thermal infrared band of each multispectral image. The example of matching a band with 30 meter resolution to a band with 15 meter resolution presumably means that the 30 meter visible light band is spatially matched with the 15 meter panchromatic band. Lindgren discloses spatially matching a plurality of multispectral band images produced by different sensors, the multispectral band images having different resolution levels (see column 6 lines 2-3 describing spatially overlapping visible light and panchromatic images) and spectrally correcting one or more of the spatially matched images based on one or more of the other images (see column 2 lines 25-29).

Lindgren does not disclose performing at least one of a solar illumination correction and an atmospheric correction on the spatially matched images.

Fraisse discloses performing at least one of a solar illumination correction and an atmospheric correction on the spatially matched images (see column 2 line 47- column 7 line 21).

It would have been obvious to one of ordinary skill in the art at the time of the invention to perform the atmospheric correction of Fraisse with the pan sharpening method of Lindgren to increase the image resolution as taught by Fraisse at column 7 lines 19-22.

For claim 2, Lindgren discloses equalizing the resolution levels in the images and the means for equalizing the resolution levels (see column 2 lines 29-31).

2. Claim 3 is rejected under 35 U.S.C. 103 as being anticipated by Lindgren in view of Fraisse and U.S. Patent No. 5,995,681 issued to Lee et al. ("Lee").

For claim 3, Lindgren and Fraisse disclose the elements of base claims 1 and 2.

Lindgren and Fraisse do not explicitly disclose setting a plurality of control points in the images based on landmark information and aligning the images based on the set control points.

Lee discloses setting a plurality of control points in the images based on landmark information and aligning the images based on the set control points as shown in Figure 1.

It would have been obvious to one of ordinary skill in this art at the time of this invention to align the panchromatic and multispectral images of Lindgren using the control points obtained from a survey or reference image of the geographical area of interest in order to co-register the images as taught by Lee in columns 1-2 and figure 1.

3. Claims 4-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lindgren in view of Fraisse and Lee as applied to claim 3 above, and further in view of U.S. Patent No. 5,864,632 issued to Ogawa et al. ("Ogawa").

For claim 4, Lindgren, Fraisse and Lee disclose the elements of base claim 3.

Lindgren, Fraisse and Lee do not explicitly disclose determining locations of a plurality of landmarks, presenting a selected landmark, setting a control point approximately adjacent to the selected landmark, and repeating until a threshold number of control points are set.

Ogawa in step 202 of figure 2, figure 7 and column 6 lines 32-38 shows determining locations of a plurality of landmarks, presenting a selected landmark, setting a control point approximately adjacent to the selected landmark, and repeating until a threshold number of control points are set.

It would have been obvious to one of ordinary skill in this art at the time of invention to set control points in the images of Lindgren, Fraisse and Lee adjacent to selected landmarks as shown by Ogawa for the purpose of aligning multiple images of the same geographic location as taught by Ogawa at column 5 lines 33-36.

For claims 5-6, Ogawa in figure 7 shows the landmarks include a building and a field. Given the fact that the neither the claims nor the specification establishes a critical distinction between a building and a school building, or a field and a football field, one of ordinary skill in the art would obviously recognize that the building of Ogawa can be a school building and the field can be a football field.

For claims 7-8, Lindgren discloses setting the multispectral resolutions to an equalized resolution in the abstract and figure 4.

4. Claims 9-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lindgren in view of Landsat-7 Science Data User's Handbook solar illumination algorithm ("Landsat-7") cited by applicant on pages 5-7 of the originally filed disclosure. Although the Landsat-7 algorithm does not list a publication date, presumably this is admitted prior art and not an invention by applicants.

For claim 9, the means for spatially matching and means for spectrally correcting are defined by the specification as computer software that is executed by a processing system, which is disclosed by Lindgren as discussed at length in the response to arguments and again in the rejection of claim 1 above, and the means for performing atmospheric correction is disclosed by Landsat-7. It would have been obvious to one of ordinary skill in the art at the time of invention to perform solar illumination correction on the satellite images of Lindgren for the benefit of reducing between-scene variability.

For claim 10, Lindgren discloses equalizing the resolution levels in the images and the means for equalizing the resolution levels (see column 2 lines 29-31).

5. Claim 11 is rejected under 35 U.S.C. 103 as being anticipated by Lindgren in view of Landsat-7 as applied to claims 9-10 above and further in view of U.S. Patent No. 5,995,681 issued to Lee et al. ("Lee").

For claim 11, Lindgren and Landsat-7 disclose the elements of base claims 9-10.

Lindgren and Landsat-7 do not explicitly disclose setting a plurality of control points in the images based on landmark information and aligning the images based on the set control points.

Lee discloses setting a plurality of control points in the images based on landmark information, aligning the images based on the set control points, and aligning images based on latitude and longitude as discussed in column 1 lines 48-50 and shown in Figure 1. It would have been obvious to one of ordinary skill in this art at the time of this invention to align the panchromatic and multispectral images of Lindgren

using the latitude, longitude, or control points obtained from a survey or reference image of the geographical area of interest in order to co-register the images as taught by Lee in columns 1-2 and figure 1.

6. Claims 12-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lindgren in view of Landsat-7 and Lee as applied to claim 11 above, and further in view of U.S. Patent No. 5,864,632 issued to Ogawa et al. ("Ogawa").

For claim 12, Lindgren, Landsat-7 and Lee disclose the elements of base claim 11. Ogawa in step 202 of figure 2, figure 7 and column 6 lines 32-38 shows determining locations of a plurality of landmarks, presenting a selected landmark, means for setting a control point approximately adjacent to the selected landmark, and repeating until a threshold number of control points are set. It would have been obvious to one of ordinary skill in this art at the time of invention to set control points in the images of Lindgren, Landsat-7 and Lee adjacent to selected landmarks as shown by Ogawa for the purpose of aligning multiple images of the same geographic location as taught by Ogawa at column 5 lines 33-36.

For claims 13-14, Ogawa in figure 7 shows the landmarks include a building and a field.

For claims 15-16, Lindgren discloses setting the multispectral resolutions to an equalized resolution in the abstract and figure 4.

7. Claims 17, 20-21 and 23-24 are rejected under 35 U.S.C. 103 as being unpatentable over Lindgren in view of Landsat-7 and further in view of U.S. Patent No. 5,995,681 issued to Lee et al. ("Lee").

For claim 17, Lindgren discloses spectrally correcting one or more of the spatially matched images based on one or more of the other images (see column 2 lines 25-29). Landsat-7 performing a solar illumination correction. It would have been obvious to one of ordinary skill in the art at the time of invention to perform solar illumination correction on the satellite images of Lindgren for the benefit of reducing between-scene variability.

Lee discloses a system for aligning a plurality of satellite images 12 from different sources (such as airborne or spaceborne camera or radar systems, diagrammatically illustrated at 10 and 11, respectively in Figure 1), user interface device 24, a display device 25, a database for storing landmark information (the workstation 24 stores reference images 29 in its memory), a processor coupled to the user interface device, the display device, and the database, the processor including a first component for instructing the display device to present one of the satellite images based on the stored landmark information, a second component for setting control points in the satellite images based on a signal generated by the user interface, and a third component for aligning the images based on the set control points (see column 1 line 52-column 2 line 10 which discusses a skilled operator at an image processing workstation 24 examine the display 25 of the working digital image 16 to locate ground control points 27. The ground control points are obtained from stored landmark information such as a survey of the area of interest. By clicking on a cursor 31 that has been manually positioned

over a control point in the working image, the operator supplies an offset which is compared with the actual coordinates of the ground control point in the reference image 29). It would have been obvious to one of ordinary skill in this art at the time of this invention to align the panchromatic and multispectral images of Lindgren using the control points obtained from a survey or reference image of the geographical area of interest in order to co-register the images as taught by Lee in columns 1-2 and figure 1.

For claim 23, Lindgren discloses setting multispectral bands to equalized resolution levels as shown in Figure 4.

For claim 24, setting the resolution level to a highest level is shown by Lindgren in Figure 4.

8. Claims 18-19 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lindgren in view of Landsat-7 and Lee as applied to claim 17 above, and further in view of U.S. Patent No. 5,864,632 issued to Ogawa et al. ("Ogawa").

For claim 18, Lindgren, Landsat-7 and Lee disclose the elements of base claim 17. Ogawa in figure 7 discloses the landmark includes a building, which can be a school. It would have been obvious to one of ordinary skill in this art at the time of invention to set the control points of Lee using school building information for the purpose of aligning the multiple images of the same geographic location as taught by Ogawa at column 5 lines 33-36. It would have been obvious to one of ordinary skill in this art at the time of invention to set control points in the images of Lindgren, Landsat-7 and Lee adjacent to selected landmarks as shown by Ogawa for the purpose of aligning

multiple images of the same geographic location as taught by Ogawa at column 5 lines 33-36.

For claim 19 Ogawa discloses that the building information includes location information.

For claim 22 Ogawa discloses that the visual feature includes a field, which obviously can be a football field.

9. Claims 25 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee in view of Lindgren.

For claim 25, Lee discloses a user interface comprising a first component for displaying one of the satellite images (display device 25), a second component for selecting a landmark from a database of landmarks located within a geographic area common to the plurality of satellite images (see ground control points 27 discussed at column 1 lines 52-61 which together are "a database of landmarks" and library of images 130 discussed at col. 4 lines 58-60 which is a database of images having landmarks); a third component for adjusting the displayed satellite image to present the selected landmark (see column 1 lines 52-61); and a fourth component for selecting a control point associated with a visual feature that is approximately adjacent to the selected landmark (see column 1 lines 52-61 and col. 5 lines 16-34).

Lindgren discloses multispectral band satellite images are set to equalized resolution levels (see figures 1 and 4).

It would have been obvious to one of ordinary skill in the art at the time of invention to equalize the resolution levels of the images displayed in Lee for the benefit of having higher spatial resolution multispectral imagery as taught by Lindgren in the abstract.

For claim 29, setting the resolution level to a highest level is shown by Lindgren in Figure 4.

10. Claims 26-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee in view of Lindgren and further in view of Ogawa.

Lee and Lindgren disclose the elements of base claim 25.

For claim 26, Ogawa discloses that the building information includes location information.

For claim 27 Ogawa discloses that the visual feature includes a field, which obviously can be a football field.

It would have been obvious to one of ordinary skill in this art at the time of invention to set the control points of Lee using school building information for the purpose of aligning the multiple images of the same geographic location as taught by Ogawa at column 5 lines 33-36.

11. Claims 30-32 are rejected under 35 U.S.C. 103 as being anticipated by Lindgren in view of U.S. Patent No. 5,995,681 issued to Lee et al. ("Lee").

For claim 30, Lindgren discloses spatially matching images produced by different sensors (see Lindgren column 6 lines 2-3 describing spatially overlapping multispectral and panchromatic images) spectrally correcting one or more of the spatially matched images based on one or more of the other images (see Lindgren column 2 lines 25-29). Lee discloses setting a plurality of control points in the images based on landmark information and aligning the images based on the set control points as discussed in columns 1 and 2 and shown in Figure 1.

It would have been obvious to one of ordinary skill in this art at the time of this invention to align the multispectral images of Lindgren using the control points obtained from a survey or reference image of the geographical area of interest in order to co-register the images as taught by Lee in columns 1-2 and figure 1.

For claim 31, Lindgren extracts radiometrically stable data, aggregates the data from a first image, compares the aggregated data to radiometric data from a second image, generates a correction factor, and applies the correction factor to the radiometric data of the second image as shown in figures 1 and 2.

For claim 32, Lindgren discloses spatially matching multispectral band images of different resolution levels as shown for example in figures 1 and 4.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeffrey S. Smith whose telephone number is 571 270-1235. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jingge Wu can be reached on 571 272-7429. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JSS
August 28, 2007

JINGGE WU
SUPERVISORY PATENT EXAMINER